

Leland Medley Humble passed away peacefully at home on 4 August 2020 with his family by his side. Lee was born 3 November 1951 in Dawson Creek, British Columbia, and was raised in Nelson, a beautiful town nestled in the Selkirk Mountains in eastern BC. Here, where nature was at his doorstep, Lee developed an appreciation of the outdoors at an early age. Following high school, he worked as a heavy equipment operator for the Canadian Pacific Railroad; trains remained a passion for Lee for the rest of his life. Lee attended Selkirk College in Nelson and completed his undergraduate training in biology at the University of Victoria in 1977. It was here that he started his life-long fascination with insects and, under the guidance of Richard Ring, completed his PhD on insect cold tolerance with his dissertation on “Life histories and overwintering strategies of some arctic sawflies and their hymenopterous parasitoids”.

His graduate research took him to the Canadian high Arctic for several summers. He had many stories to tell of his adventures in the north: remote camps, exciting flights in small planes, encounters with large animals and memorable interactions with locals and other researchers.

These were busy years for Lee; at the same time as being a full time PhD student, he was the father of a young family and had a job with Dave Gillespie at Agriculture Canada studying parasites and hyperparasites of the European winter moth, *Operophtera brumata* L. In 1985 a position for a forest entomologist came open at the Pacific Forestry Centre with the Canadian Forest Service in Victoria. John Borden, then a professor at Simon Fraser University, inspired by a research talk that he heard Lee give, encouraged him to apply for the job. So began a 35-year career of scientific discovery, collaboration and fun; Lee often remarked at his good fortune to be paid for enjoying his hobby! Lee was hired to provide entomology support to the federal Forest Insect Disease Survey (FIDS), specifically for the BC & Yukon Region. This involved rearing and identifying forest insects collected in the annual surveys, overseeing the insectary and Pacific Forestry Centre Arthropod (PFCA) collection and providing general diagnostic services; and pursuing research interests in what time remained. One of these areas of research examined the biodiversity of arthropod communities in the tree canopies of temperate rain forests; work with Neville Winchester and Richard Ring and as a component of the Montane Alternative Silviculture Systems (MASS) project.

Lee was an active participant in the British Columbia Plant Protection Advisory Council (BCPPAC) and, in addition to chairing the forest pest committee and serving on the Regional Emergency Action Coordination Team (REACT), he was actively involved in the science and politics of gypsy moth control. He provided advice regarding the European gypsy moth, *Lymantria dispar dispar* L. and the Asian gypsy moth, *L. dispar asiatica*, *L. dispar japonica*, *L. umbrosa*, *L. albescens*, and *L. postalba*, found in North America, associated with cargo ships in 1991. Lee helped develop a DNA-based diagnostic test to differentiate the European from the Asian sub-species and in the process set up a high security quarantine room at the Pacific Forestry Centre. In the early 1990s, his Asian gypsy moth work took him to the Russian Far East where he worked on an international collaboration addressing moth attraction to light at shipping ports. This led to adventures



M. Noseworthy

Leland Medley Humble
(3 November 1951 – 4 August 2020)

in the forests of Siberia and opened his eyes to the significance of the international movement of forest pests.

A few years later, in 1996, two important events dramatically affected Lee's career: the FIDS program was ended and the Asian longhorned beetle, *Anoplophora glabripennis* (Motschulsky), was found in Brooklyn, New York. Lee now focused most of his time on alien invasive species; identifying established alien species, developing surveillance and diagnostic tools, studying pest movement pathways and finding practical mitigation opportunities.

He kept his research relevant to real issues by working closely with the Canadian Food Inspection Agency (CFIA), the US Animal and Plant Health Inspection Service (APHIS), and the US Forest Service as well as international organizations such as the International Union of Forest Research Organizations (IUFRO), the International Forestry Quarantine Research Group (IFQRG) and the North American Plant Protection Organization (NAPPO). Lee carried out joint research projects on forest insect detection systems in China with scientists at the Chinese Academy of Forestry and was recognized as an associate research scientist at the Jilin Provincial Academy of Forestry Science. His expertise in insect rearing techniques provided key data to support the development and refinement of the international wood packaging standard, ISPM 15. Lee also continued his work on preventing the introduction and establishment of Asian gypsy moth by providing his scientific expertise during discussions with Asian countries impacted by the implementation of the North American phytosanitary standard – Guidelines for Regulating the Movement of Vessels from Areas Infested with the Asian Gypsy Moth (NAPPO RSPM 33).

Lee worked throughout his career on locating and identifying predators of hemlock woolly adelgid, *Adelges tsugae* Annand. In the early 2000s he identified *Laracobius nigrinus* Fender as a biological control agent for use in eastern North America and more recently he located and collected hemlock woolly adelgid for further work on new biocontrol agents with graduate students and colleagues in Canada and the USA.

Lee was also keenly interested in the curation of insect collections and contributed to and modernized the collection at the Pacific Forestry Centre. In addition to the physical collection, he helped build DNA reference libraries for many groups of insects including bark and woodborers and contributed through his own collections and those of his PhD student, Jeremy deWaard, to the Barcode of Life project with Paul Hebert.

In the final major project of his career, Lee circled back to some of the skills he learned in graduate school, thermotolerance of insects. But this time, instead of cold, he built a device to very precisely measure the high temperatures required to kill insects. This elegant piece of equipment, now known as the Humble Water Bath, hand-crafted by Lee, is a critical tool that will be used to change global trade regulations in years to come.

Lee Humble was a great teacher and mentor. He was an adjunct professor at the University of British Columbia and served on the Master's and PhD committees of numerous graduate students including Ashley Lamb, Gabriella M. Zilahi-Balogh, Jeremy deWaard, Susanne Kuhnholz, Cynthia Broberg, Stacey Wilkerson, Sepideh Massoumi-Alamouti and Eveline Stokkink. He also mentored many students through the co-op program, many of whom came back year after year and were so inspired that they became entomologists themselves. His true classroom, however, was in the forest where he knew plants and insects and how they interacted. He was always looking for ecological connections, formulating theories and planning new experiments. Those who were lucky enough to work with him in the field experienced Lee in his element.

Lee was the recipient of many well deserved awards including the Commemorative Medal for the 125th Anniversary of the Confederation of Canada, for service to Canada (1992), the Canadian Forest Service Merit Award for Team Achievement (1999), Natural Resources Canada

(NRCan) Department Merit Award (1999), the Head of the Public Service Award for Excellence in Policy (1999), Outstanding Foreign Expert Award from Jilin Province, PR China (2001), Ontario Federal Council, Leadership through Collaboration Award (2004), the Canadian Forest Service Achievement Award (2012), Lifetime Achievement Award, Professional Pest Management Association of British Columbia (2012), NRCan Departmental Achievement Award (2013).

In addition to his passion for entomology, Lee was a skilled woodworker, photographer and wildlife enthusiast. Many specialized pieces of lab equipment were meticulously designed and crafted out of wood, plastic or metal by him. He was brimming with novel ideas, full of knowledge of entomology, botany, ecology, forestry, and had an unstoppable enthusiasm for science. He was a true renaissance scientist.

Lee Humble was an exceptional scientist who inspired his colleagues with his passion for science and made significant contributions to forestry and entomology. John Borden, his mentor and long-time colleague and friend, fittingly said, "An invasive insect lurking in British Columbia's forests will not regret the passing of Lee Humble but all of us who knew him certainly will".

Meghan Noseworthy and Eric Allen
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Lee at the microscope.